



**Past Redistribution and Future Imbalances:
Generational Accounts in the Hungarian Pension System**

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Introduction

In this paper we measure redistribution among subsequent generations in the Hungarian pension system taking into account the entire lifetime of the generations in question.¹ As a technical framework we use generational accounting supplemented with retrospective data. Retrospective generational accounts are calculated in the following manner. First, we construct the net age-contribution profile as the difference between contributions and pensions typical for individual year-groups for the year chosen as a starting point, in this case 2000. Since each cohort is characterised by a single number the net contribution profile is an 86 element vector. We begin with those born in the year 2000, that is to say, with 0 year olds and we placed those 85 and older into one age group. The next step was to calculate values for this vector based on the available information from 1950, when the pay-as-you-go system began, to 2000. After this, we supplemented the resulting 86x51 data matrix based on the start up year net contribution profile for each year up to 2100, taking into consideration assumptions pertaining to productivity and discounting along with cohort mortality. Finally, progressing diagonally in the resulting 86x151 matrix we followed individual year-groups, summing the present value of their net contributions over their entire lifetime.

Net contribution is the difference between contributions and pensions. If the amount over an entire lifetime is negative, the age group did well, for they received more pension than they paid contributions. We need to make one more comment to make the method understandable: Generational accounting treats future generations as one single year-group. Further details of the method can be found in Auerbach, Kotlikoff and Leibfritz (1999).

1 Net contribution profile in the base year

In the case of the Hungarian pension system setting the starting balance is itself controversial. We cannot consider the data in Table 1 as the balance for the pension system for two reasons. The two functions of social security, compensation for decreases of earning ability due to ageing and to poor health in active age, become convoluted, both among revenues and spending. The fact that these two items become entwined in the budget is not accidental. During a person's active lifetime his health slowly but continually worsens with age, productivity decreases. At the same time technical advances and other labour market shocks quickly devalue

¹ Useful comments from András Simonovits, research assistance from Béla Janky, András Gábos are gratefully acknowledged. We are also indebted to participants of a CANPI-meeting for comments on an earlier version.

his skills and labour market experiences; ageing is not merely a biological function, it is a labour market category as well. Productivity can decrease drastically even if there is no decrease in physical health. It is not by chance then that the boundaries between disability pensions and old age pensions, and between the jurisdictions of the Health Insurance Fund (HIF) and the Pension Insurance Fund (PIF) become blurred.

Table 1:
The Hungarian Social Security Pension System, Costs and Revenues, 2000
(million \$)

Costs			Revenue		
1	Old age pension	2,755.5	9	Contributions, PIF	3,517.9
2	Disability and accident disability pension, PIF	652.0	10	Miscellaneous contributions, ² PIF	51.4
3	Disability and accident disability pension, HIF	512.4	11	Extraordinary revenue ³ PIF	24.5
4	Dependants' pensions	556.1	12	Contributions, HIF	512.4
5	Miscellaneous pensions financed by PIF	1.6	13	Transfers from central budget ⁴	150.0
6	Services not financed by Social Security	413.7	14	Compensation for contributions lost to mandatory private pension funds	251.6
7	Operational costs ¹	101.0	15		
8	Total	4,992.4	16	Total	4,507.9

Source: Calculated from CSO (2001, 60) and CANPI (2000, 22-24).

PIF: Pension Insurance Fund, HIF: Health Insurance Fund

¹ Postal, operational and asset management costs. ² Interest on overdue payments, fines, returns of expenditures, operational revenue. ³ Revenues of asset management. ⁴ Misc. contributions and incidentals and financing from the central budget without compensation for contributions lost to mandatory private pension funds

Therefore, it is no accident that various combinations of the above mentioned entries result in different definitions of balances and budget deficits. These are presented in Table 2. We studied four approaches; the fourth of these is introduced below. The first we call the budget approach: revenue is what the PIF balance considers to be revenue, expenditures, that it considers as such while deficit is the differences between the two. Contrast to this the official ruling on pensions and pension type services covers all cases that, in some way or other, are related to leaving the labour market completely or in part for good, whether financed by the central budget or the social security system (this is the category used by the Central Statistical Office (CSO) Social Security Statistic Yearbook and the Central Administration of Na-

tional Pension Insurance (CANPI) Statistics Yearbook as well). We call this approach the “leave the labour market” approach. A version of this can be read in Rocha and Vittas (2000), which deals with the effects of the pension reform on the long term stabilisation of the pension system reform. The authors, as far as it can be reconstructed from the study, calculated with all pensions and pension related services except those that were not financed by social security. Hence, we call this the “social security supported leave of the labour market” approach.

In our opinion all three approaches are consistent and are supported by valid principles. However, below we present a fourth approach which better suits the generally accepted insurance principle approach to the old age pension system. Accordingly the old age pension system does not contain insurance against decreases in income due to a decline in the health of the active age group (however, it does contain certain types of life insurance), and consider only those claims valid that are substantiated by paying contributions.²

Before we introduce the “old age pension insurance” approach balance, first we cover the three alternatives. All three treat old age pensions and that portion of disability and accident disability benefits that the PIF finances as expenditures. Similarly, all three approaches are unanimous in the way they handle dependant pensions and other pensions, including those financed by PIF. However, the PIF budget does not list that portion of disability or accident disability pensions financed by the HIF as pension expenses, while it is listed in the pension and pension services columns. Rocha and Vittas place it there as well. Additionally, services not financed by social security are treated as part of the pension system the official setting of pensions and pension like services, diverging from the other two approaches. This group of

² The fact that the insurance against decline of health in active age is not included in the old age pension system, while life insurance against premature death is hints of inconsistencies in the generally accepted insurance principle approach to old age pensions. However, we find a calculation that does not take survivors’ pensions into consideration as part of the pension system inappropriate, but so is that which does not make any distinctions between the causes, such as active age disability and old age retirement, of leaving the labour market. This inconsistency could be avoided by a possible fifth approach called “endowment life insurance” approach. According to this the social security pension system most resembles the endowment life insurance from among insurance products on the market, one that accumulates contributions and pays benefits when retirement age is reached, however, should the insured die during the savings period their dependants shall receive the benefits. The accumulation period in a funded system is merely the compilation of contributions during ones working life. Collateral for the pay-as-you-go system is not physical, but rather human capital: the ability and willingness of the growing new generation to pay their contributions. Accumulation is the rearing, training and increasing the work effectiveness of new generations. The process of accumulating human capital is covered by the fact that the pension formula does not generally take into consideration resources directed at child rearing. The human capital collateral in these types of systems, however, is clearly shown by the demographic susceptibility of pay-as-you-go systems. The other indicator for human capital-collateral is that in case of economic or social cataclysm the pay-as-you-go system is generally more stable and regenerates faster than the funded scheme since human capital is more difficult to destroy than physical capital. The “endowment life insurance” approach has yet to be worked out in detail; to the best of our knowledge such calculations have not been made anywhere.

expenses contains approximately 30-40 services, a part of which are explicitly pensions (early retirement, pre-retirement, miner's pension), the other part functions as pension in the current labour market situation (temporary benefits, regular social benefits), while a few incidentally were grouped among the expenditures (blind person's benefits, war veteran care, diabetes benefits, etc.). Contrarily, only the PIF-balance sheet takes operational costs (postal, asset management costs, operational costs) into consideration, although it is true that these items – just over \$101 million – are pittance in comparison to the rest.

Table 2:
Budget and deficit in the pension system
(Data for the year 2000)

	Expenditures		Revenue		Deficit million \$
	Costs Items ¹	million \$	Revenue items ¹	million \$	
Budget approach	1,2,4,5,7	4,066.3	9,10,11,13,14	3,995.5	70.8
Leave the labour market approach	1,2,3,4,5,6	4,891.4	9,10,11,12,13,14	4,507.9	383.5
Social Security Supported leave the labour market approach	1,2,3,4,5	4,477.7	9,12,14	4,282.0	195.7
Old age pension approach	1,2,4,5,6 ² ,7	4,286.6	9.14 ³	3,842.0	444.6

¹ Based on Table 1.

² We only took pension type ones (pre-, miner and early retirement pensions, temporary benefits, regular social benefits) into consideration from among costs not financed by social security.

³ Since it is not the social security system but rather the pension system balance that we calculate we make use of the actual amount of contributions paid into mandatory private pension funds (\$324.1 million) and not budgetary compensation of the PIF for these lost contributions (\$251.6 million).

Similar discrepancies are noticeable on the revenues side as well. Although all sources concurred unanimously to treat pension contributions made by both employees and employers as revenue, smaller items – such as other contribution type revenues, for instance, interest on overdue payment and fines, mistakenly paid, rebated pensions and operational revenue, or extraordinary PIF revenue – is not unanimous. Rocha and Vittas do not take either into consideration, however, the PIF takes both into consideration. In both cases where HIF financed disability and accident disability pensions are considered to be part of the pension expenses it is logical to take contributions used to cover these into consideration as well, despite the fact that these contributions will be paid into the health system and not the pension system.

Accounting for extraordinary revenue is not unified – the PIF-balance sheet logically shows it even if it blurs long term calculations – nor is the taking into consideration of central budget contributions. Rocha and Vittas do not take either extraordinary revenue nor those

budgetary items into consideration which do not serve as replacements for contributions lost to the mandatory private pension funds.

This long list also shows that it is not easy to draw the boundaries of the pension system and that is why providing pension budget deficits depends on a series of research and administrative decisions. Based on the PIF-balance sheet the deficit is negligible, 0.14 percent of the GDP. If we compare the amounts of pensions and pension services to all possible revenue sources, that is, if we take the smallest possible deficit by definition belonging to the “leave the labour market” approach into consideration it is still much larger than the previous at 0.7 percent of the GDP. Finally, the “social security supported leave the labour market” approach balance shows a 0.4 percent of the GDP.

Below we present, in accordance with the “old age pension insurance” approach, an alternative grouping of pension costs and revenues. We strive to separate those items which are received by those who leave the labour market due to their age from those which are received by those who leave the labour market due to a decrease in health, leading to a decrease in income, over their working lifetime. At the same time we consider labour market ageing as ageing as well. This means that we do not list a segment of disability and quasi disability pensioners among those who actually left the labour market due to disabilities, since in the current state of the Hungarian labour market, we would hardly be mistaken if we consider lower category of disability pensioners and beneficiaries of similar services as persons who leave the labour market not for health reasons but rather because they cannot find jobs yet they are below retirement age.

Based on this we treat old age and dependants pensions as pension expenditures. Among disability pensions – accepting the administration’s categories – we only take those into consideration which are paid for by the PIF, however, we count with all of these, regardless of the age of beneficiaries being above or under retirement age. (The PIF pays for disability services for those in disability category I and II, though they are under retirement age, just as for those who are above). According to the current situation of the labour market the under-age low level disability pensions actually function as old age pensions, that is, they are an escape route from the labour market for those who, by age, are not entitled to old age pensions, however they have little chance at finding employment. Regional distribution of disability pensions clearly shows that we are dealing with labour market ageing and not the disabling of the active workforce. Upon similar consideration we placed those services not covered by social security funds into the pension system, which, according to administrative categories do not, however based on economic content do function as pensions. These are the so

called employment policy pensions (early retirement, miner's pension, pre-retirement), temporary contributions and regular social benefits.

Based on the definition of the “old age pension insurance” approach the costs are \$4.3 billion, less than if we take the grand total of pension and pension services into consideration (“leave the labour market” approach) or the entire old age and disabilities system (“social security supported leave the labour market” approach) but more than if we use the PIF-balance sheet as our starting point.

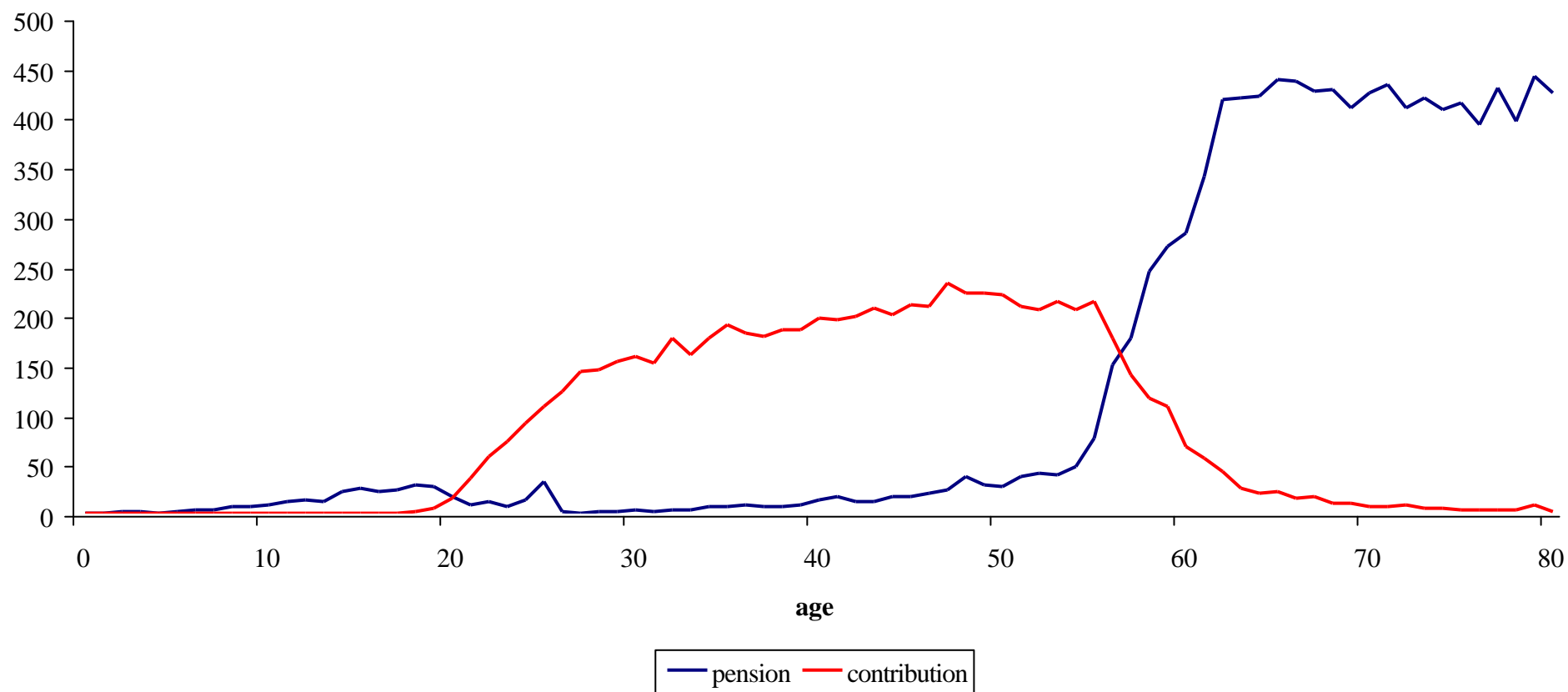
The CANPI provided us with data to estimate the age profile of contributions. We used a 1 percent layered sample according to the main services.³ The sample contains a total of 31,487 observations and mirrors the state of affairs for January 2000. We are aware of the fact that pension averages for the entire year differ slightly from twelve times the first month's total, this difference, however, according to PIF staff personal statements is negligible, all together 0.2 percent. The oldest age group we took into consideration is 85 years old, we placed all those older than this in to this age group. Case numbers for certain main services may differ from the actual 1 percent of the population layer since the standard deviations were taken into consideration for main services when figuring out the layer sizes. All observations contain the totals for supplemental services as well not only the main services. Hence, it is possible to calculate the amount for all services.⁴ By age group benefits in the age-pension profile (see Diagram 1) we mean *the average for the entire year group*, and not the average service for those receiving particular benefits.

On the revenue side, in accordance with the “old age pension insurance” approach, we only calculate with pension contributions and we ignore all other budget support and those social security contributions which were not paid into the pension system. However, since our model concentrates on the pensions system and not on social security, we take that amount of

³ A recipient can obtain several services at the same time so the administration distinguishes between main and supplemental services. This reflects a hierarchy of services, e.g. old age pension of own right is considered a main service regardless of the entitlement to any other service.

⁴ Further details of these calculations can be found on the TÁRKI homepage, www.tarki.hu in Gál, Janky, Simonovits and Tarcali (2001).

Diagram 1:
Pensions and contributions by year-groups, in 2000 (thousands of HUF)



those contributions redirected to private pension funds into consideration which actually were transferred to the funds (\$324.1 million in 2000) and not that which the budget reimburse (\$251.6 million).⁵ Therefore, in total, we count \$3.8 billion in revenues, which is the smallest amount of revenue from the above mentioned pension systems-definitions. The “old age pension insurance” approach accordingly produced a \$444.6 million deficit in the pension budget, that is 0.9 percent of the GDP

We calculated the age-profile of the contributions based on two anonymised samples taken from tax files for 1998 provided by the Tax Office. One is a 0.5 percent random sample of taxes filed by the employer and contains 10,784 cases, the other a 1 percent random sample of self-assessed tax and contains 21,305 cases. Since our data on benefits are from 2000 we estimated contributions for 2000 based on the Tax Office files from 1998 by multiplying taxable income by the growth rate of the average net income for 1999 and 2000.

The estimate for the total contributions from the sample gives \$3,672.3 million, which is only 4.4 percent less than the amount received in the PIF and the mandatory private pension funds in 2000. We adjusted the age profile to the actual macro-sum. We present the age-profile of contributions and pensions in Diagram 1.

The diagram clearly shows that the curve of the age-profile of contributions rises steeply, then breaks off slightly around the 25-38 age group. This can most likely be explained by the prime children-rearing age of women. The 45-50 age group pays the highest contributions. After this, due to the under-age pensioners, contributions first drop slowly, then from the age of 57, the retirement age for women, they decrease rapidly.

It can also be seen in the diagram that the per capita benefits fluctuate slightly at a low level up to the retirement age time, a slight jump is noticeable at age 25, since that is where – due to our calculating process – orphan benefits are higher than average. Although according to pension statistics the average pension for those just entering retirement is higher than the average for the entire pension-population this is not noticeable in the diagram, since our calculations contain age group averages. The fact that the average pension of new pensioners is higher than the previously determined pensions is counter balanced because not all pensioners from an age group begin retirement in the same year. The total per capita services for those of retirement age basically increases with age. This rising trend is supported by official macro-statistics.⁶

⁵ See Augusztinovics et al. (2002, 497).

⁶PIF (2000).

2 Retrospective contributions and pension profile

We calculated retrospective contribution-data from 1950, the year the pay-as-you-go system was implemented to 1999 broken down into age groups similarly to the base year. Since we were working with incomplete data we had to make several simplified assumptions in order to draw up yearly age profiles. (These can also be found on the TÁRKI home page, in the above mentioned study). However, we had to overcome problems other than missing data as well.

The economy was nationalised and run by a central administration for a majority of the period examined. In such a structure prices, and within this wages, were arbitrary for the most part. The pension fund budget could not be separated from other sections of the state budget. Formally, pension contributions existed and – without any break down between pension expenditures and public health costs – social security contributions did as well. The former was deducted from the employees' wages and the later was paid by the employer. There was no link between pension contributions and costs (Jurth, 1987, 22). The situation was further complicated by the fact that non-monetary benefits played a more significant role in the distribution of incomes than it does today.

We made a few basic, but realistic, assumptions when planning our calculations. We assumed that the pension system worked perfectly in a pay-as-you-go system until the forming of social security self-governments in 1993, that is, each year they financed pensions from the actual amount of contributions made. Therefore, deficit and surplus never arose in the pension budget for any given year. We believe that our assumptions can be defended on any theoretical base in such an economic situation where the chapters of the budget blur together and even with more detailed budget data we would use this as our starting point.

According to our other assumption contributions were proportionate to wages. This assumption is less called for on theoretical grounds. Although the contribution system that came about in market economy conditions, can be considered linear to a significant extent, this is not enough in and of its own for us to declare that things were the same earlier as well. What more, in the socialist state system – as mentioned already – the monetary income as a “contribution”-base did not necessary reflect total incomes which included non-monetary personal benefits. We considered contributions proportionate to wages an appraising “focal point” that could be closer to the hub of things (in as much as such “real” contribution amounts could be theoretically established), than the other obvious focal point, the fixed amount contribution.

Our primary data from the period between 1950 and 1992 were wages or labour incomes broken down by age groups. In regards to this we do not have nearly as detailed and complete data as in the case of pensions. CSO only began making income-surveys by cohorts from the beginning of the 1960s (CSO 1971, 1981, 1982). These were not annual surveys, but rather, they were carried out approximately every five years. From the mid 1980s CSO has been offering wage-tariff data. They were collected more often (1986, 1989, 1992), and they provide in a year-group break down instead of five or ten years of

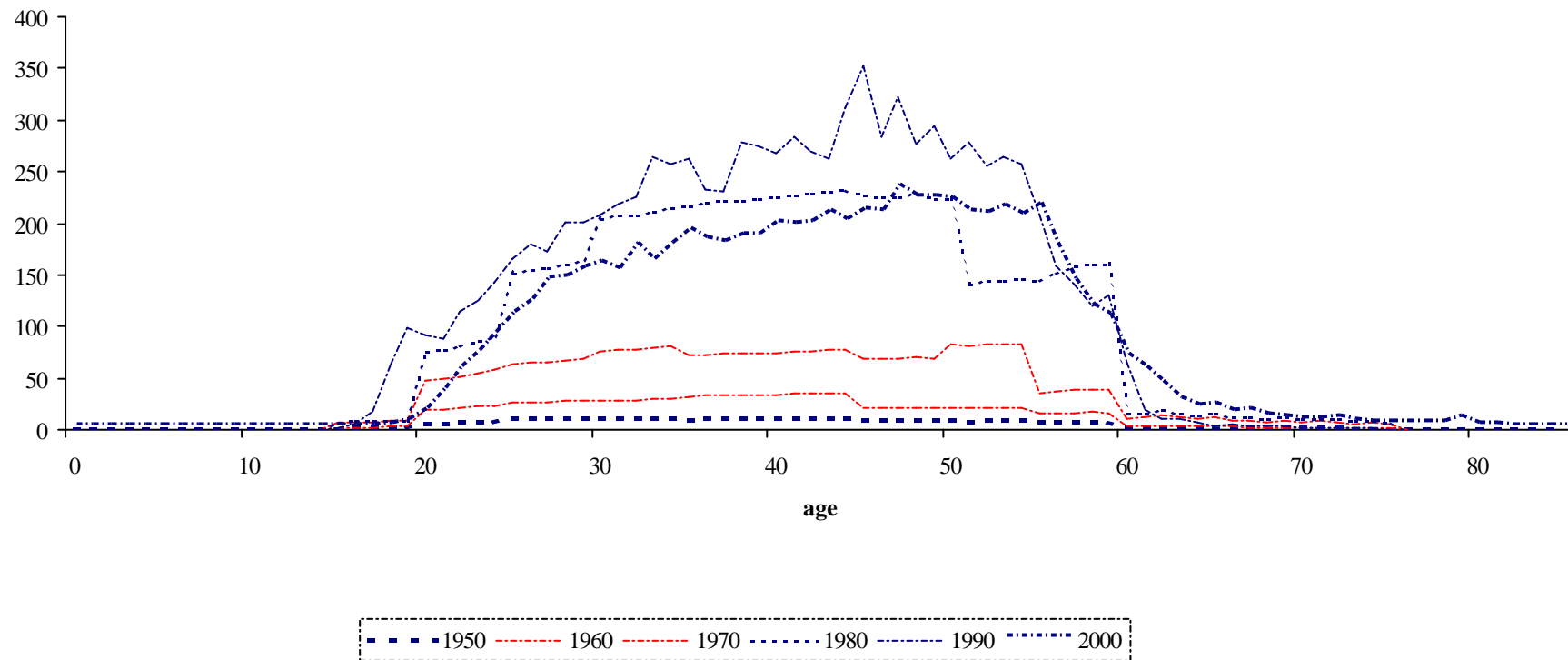
Three main short comings need be mentioned concerning the data available. On the first part CSO provided income figures with slightly varying content and cohort break downs. In certain cases they published averages only for wages, while for other years they provided complete labour-income data. These various reports did not provide completely compatible results. On the second hand not one single survey offered complete information on age-income profiles for all earners. Primarily private sector data is missing.⁷ Thirdly, the number of participants in the survey samples do not provide clear guidance concerning real active-numbers.

We have no cure for the first problem and we are forced to work with the data we have for each year. The distorted effect is lessened by the fact that for the majority of the period under question, precisely in those years for which the less refined data are available, the difference between wages and total labour income was minimal. When the difference in question had increased, data collection was already more detailed. According to our views the second short coming can be rectified in part at least with further research, however currently we have no means to do so. Considering that the number of economically active is available, we are able to down play the loss of information due to a lack of data by making the assumption that the age-earnings curve for the groups missing from the database is identical to those for whom we have data. The third deficiency does not cause any major problems because of our methods of calculating. For us it is the cohort wage-rates that are important and not the total amount of cohort wages; macro-values can be found, as mentioned, in CSO sources.

To make up for missing points in the time series we made use of the results from nearest data points. We established year-groups from the earliest wage tariff record available. Next we determined the extent to which the individual year-groups received from the overall

⁷ The private sector was just a marginal fragment of the centrally planned economy. For the late 1980s and the 1990s we have data on private sector wages.

Diagram 2:
Pension contributions by year-groups in selected years
(thousand HUF year 2000 equivalents)



wages based on average earnings (income) data and percentile earners number-data. We projected these ratios to the entire amount paid out, according to information provided by CANPI, as pensions for each year. Following this we gave the amounts in year 2000 equivalents by using the consumer price index, then, applying the total number of the individual year-groups we calculated the average contributions.

For the period beginning with 1993 we relied on the Tax Office database on personal income tax contributions. Although the tax declaration form does not contain a special row for social security contributions it offers a solid ground for estimating them. These average cohort contributions were also adjusted to the mid year number of the individual year-groups.

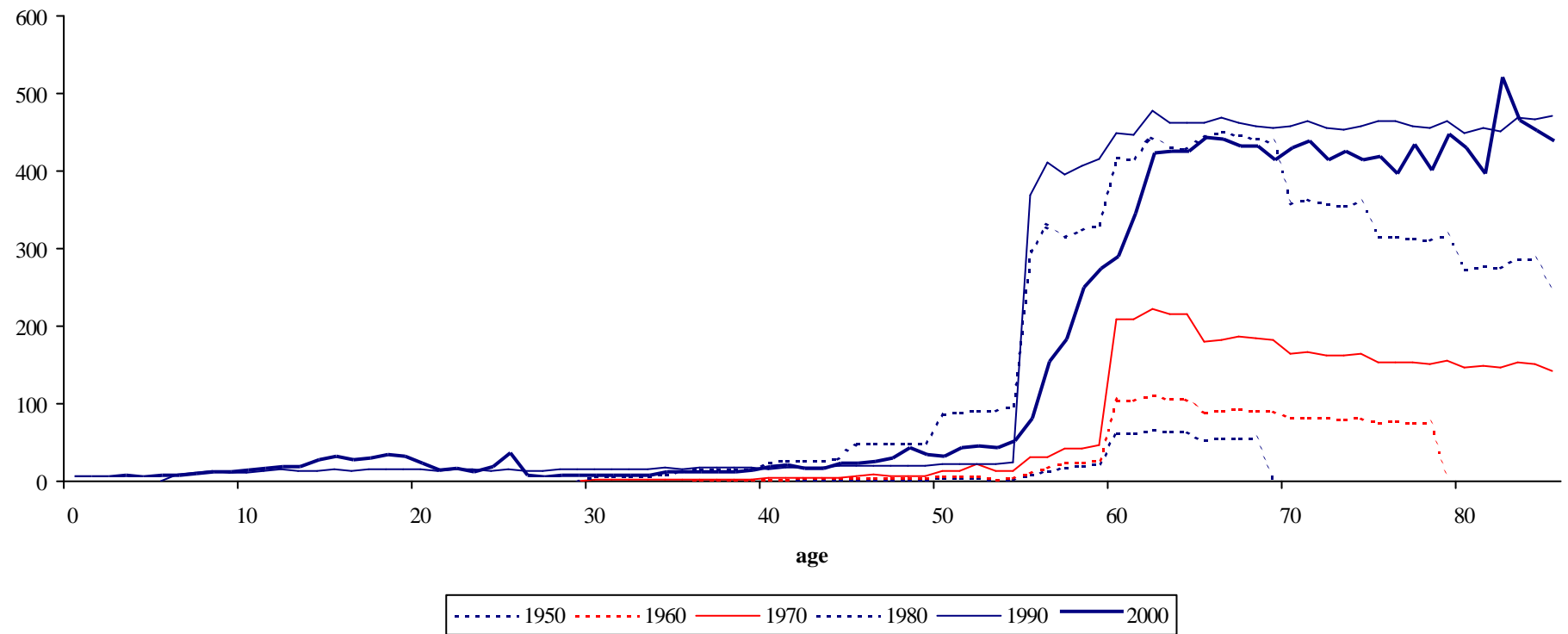
After this methodology introduction we present contribution-profiles for certain chosen years, as follows: 1950, 1960, 1970, 1980 and 1990 (see Diagram 2). For comparison reason we also provide distribution for the year 2000 as well.

Contribution profiles, at ten year intervals, clearly show the maturation process of the pay-as-you-go system which ended in a crisis. Contributions calculated on comparative values significantly increased from 1950 to 1990. More and more employees became insured, that is, paid their contributions from which an increasingly larger number of persons received larger pensions based on increasingly longer years of active service on average. The 2000 contribution values, however, are significantly lower in real value than those for 1990 and for some cohorts they even run lower for than the 1980 values. This is in part a result of a decline in real wages between 1990 and 2000. The real value of the GDP for these two years practically coincide, while the portion of wage costs within the GDP decreased. Decreases in contributions are primarily due to decreases in employment – let us recall again that the values presented in the diagram do not pertain to contribution-makers, but rather to an average member of a year-group.

Certain profiles clearly show the problems of data quality. The jagged nature of certain plots hint at sampling errors, the staircase structure suggests that year-groups for certain years was deduced from age group data. Luckily in generational accounting every year-group runs through these income courses and thus the redistribution results are not significantly distorted.

Establishing the retrospective age-pension profiles the only problem we encountered was a lack of data; we did not have to clarify any other conceptual issues. We know how many pensioners there were and what the average pension was beginning with 1950. However, the further we go back in time, the less we know about the age distribution of the pension expenses. We have only macro data from the first two decades of the system.

Diagram 3:
Pensions by year-groups for selected years (thousand HUF year 2000 equivalents)



Data is available on age groups, broken down by service type from 1971 to 1993, however these do not contain certain smaller service types. Starting with 1994 comprehensive data broken down by year-groups is available. While replacing missing data we had to once again make supplementary assumptions (see the above mentioned study on www.tarki.hu).

We present retrospective pension profiles in Diagram 3 and for the sake of comparison they are from the same years as the contribution profiles. Similarly to the above we once again present the curve for the year 2000. The shape of the curves indicate, similarly to the contribution profile curves, primarily to the maturing of the system. Distance between the curves indicates that the number of those entitled to pensions and the average number of active years they were insured both increased significantly. At the same time crisis of the 1990s is less visible on pensions than on contributions. The difference in real pensions between 1990 and 2000 is less than in the case of contributions, despite the fact that real pensions for individual pensioners decreased more than real wages per individual earners. This apparent contradiction stems from the fact that the usual comparison of real wages to real pensions only takes the earner and pensioner groups into account while the comparison of per capita contributions and pensions of demographic year-groups takes those with no contribution base into account as well, those who have left the labour market but are not pensioners. That is to say real wages decreased less than real pensions, because among the active workforce many lost their source of income while pensioners did not lose theirs.

3 Projection of start up profiles

We made use of Háblicsek (1995) predictions pertaining to the necessary workforce data. Since the predictions only calculate the expected population up to 2051 and we need longer term data we made the assumption for the period following 2051 that the population structure will not change compared to 2051. (For similar solutions see Cardarelli, Sefton and Kotlikoff (1999), and Oreopoulos (1999)) We extended the prediction to 2100 since our other calculations run to that date as well. Due to discounting longer term calculations than these will not change results.

An appropriate growth factor and discount rate must be chosen to project the starting profile and to calculate the net present values. In the interest of international comparability we used the standard generational accounting values, so we set annual productivity growth rate at 1.5 percent and the discount rate 5 percent. The country report volume containing generational accounting for 17 countries (Auerbach, Leibfritz and Kotlikoff 1999) also uses these values. We calculated pension fund real returns to be 4 percent. We also provide results of certain calculations of robustness.

Due to the non-predictive nature of generational accounting we deduce both future contributions and benefits from values characteristic for previous years and year-groups. There is a distorting effect in this, however, we have no reliable method predicting that we could have used for this. Namely, the current distortion of age-earning profiles. Kézdi and Köllö (2000) showed that the shock in the Hungarian labour market in the beginning of the 1990s significantly distorted the typical age-earning profile. Its curve became much flatter than previously, and more than usual for a market economy. The human capital of older employees devalued significantly due to the structural changes being ignored for a length of time, while those employed in the quickly expanding new sectors of the economy earning relatively high wages are younger on average. The mechanical projection of net contributions, which is dictated by generational accounting, takes the distorted curve further, albeit the age-earnings profiles are expected to approach their old slope. Considering that, to the best of our knowledge, there are no predictions pertaining to this in the literature, we strove to minimise the discretion of the researcher so we did not make any alterations to the current profile.

4 Results

In the following subsection we introduce the results of our calculations of retrospective generational accounting on data for the Hungarian pay-as-you-go system. We examined whether intergenerational redistribution can be noticed in the pension system. In order to check the validity of our conclusions we also carried out robustness tests, which are given in the following subsection.

The results coincide with international experience and show significant redistribution favourable to the first generations that enter the system. We noted the extent of the PVB/PVT⁸ values on the left Y-axis in Diagram 4, while the right-hand side Y-axis shows the present value of lifetime net contributions for individual age groups for the year 2000.

The diagram clearly shows that those born after 1880, the first to enter the system, approximately 50 year-groups, came out winners in the pension system. The deeper the curve, indicated with dotted line in the diagram, sinks into negative regions the bigger the lifetime-pensions compared to lifetime-contributions, that is the larger the net profits (the dotted line curve has to be measured at the right axis, where, the 0 point is elsewhere than at the left axis). This profit increases for the first 20-25 years continuously. Later it decreases yet remains profitable up to the now 70 year olds. From there on however, the system is a lose for every year-group. The largest net lifetime-contributors are those born between 1940 and 1955. The loss will continually decrease for those younger than them.

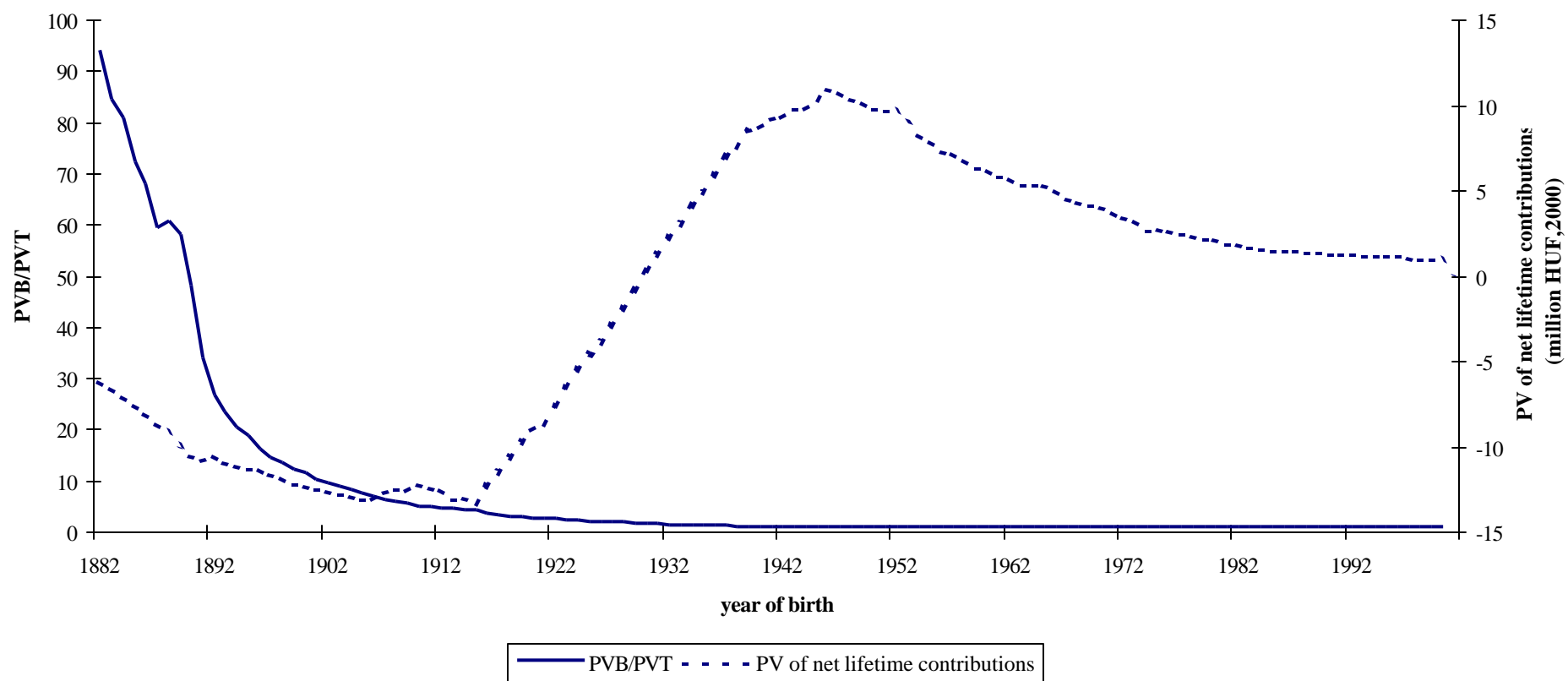
It is safe to say that the majority of today's living population, including a sizeable portion of pensioners are losers in the pay-as-you-go pension system. This conclusion naturally is only true for the representative individuals of year-groups. If we calculate lifetime net contributions according to gender or earnings we would most certainly find more winners, however losers would foot a bigger bill.

Compare these with the results of a simulation of the American pensions system,⁹ you will see that the trend is the same in both systems. The first generations to enter the system receive significant benefits for their minimal contributions. According to the solid lined curve in Diagram 4 Hungarians born in the 1880s received 55 fold returns, while those born in 1882 received over 90 fold returns. However, since the service period was quite short for the first to enter the system, pensions were only significant in comparison to contributions made. Those entering immediately on their heels had lower returns but their net balance was the highest. These age groups were those that during their service

⁸ The present value of lifetime benefits over the present value of lifetime contributions.

⁹ See Geanakoplos, Mitchell and Zeldes (1999).

Diagram 4:
PVB/PVT and net lifetime contributions in the Hungarian pension system by birth cohorts (year 2000 present values)



PVB: present value of net lifetime pensions, PVT: present value of net lifetime contributions

years only had to pay small pensions to the first-comers, while they themselves however, enter retirement after relatively long active service. As a result average pensions inevitably increased quickly while the system was maturing; profit for the younger generations first decreased, then ran at a loss.

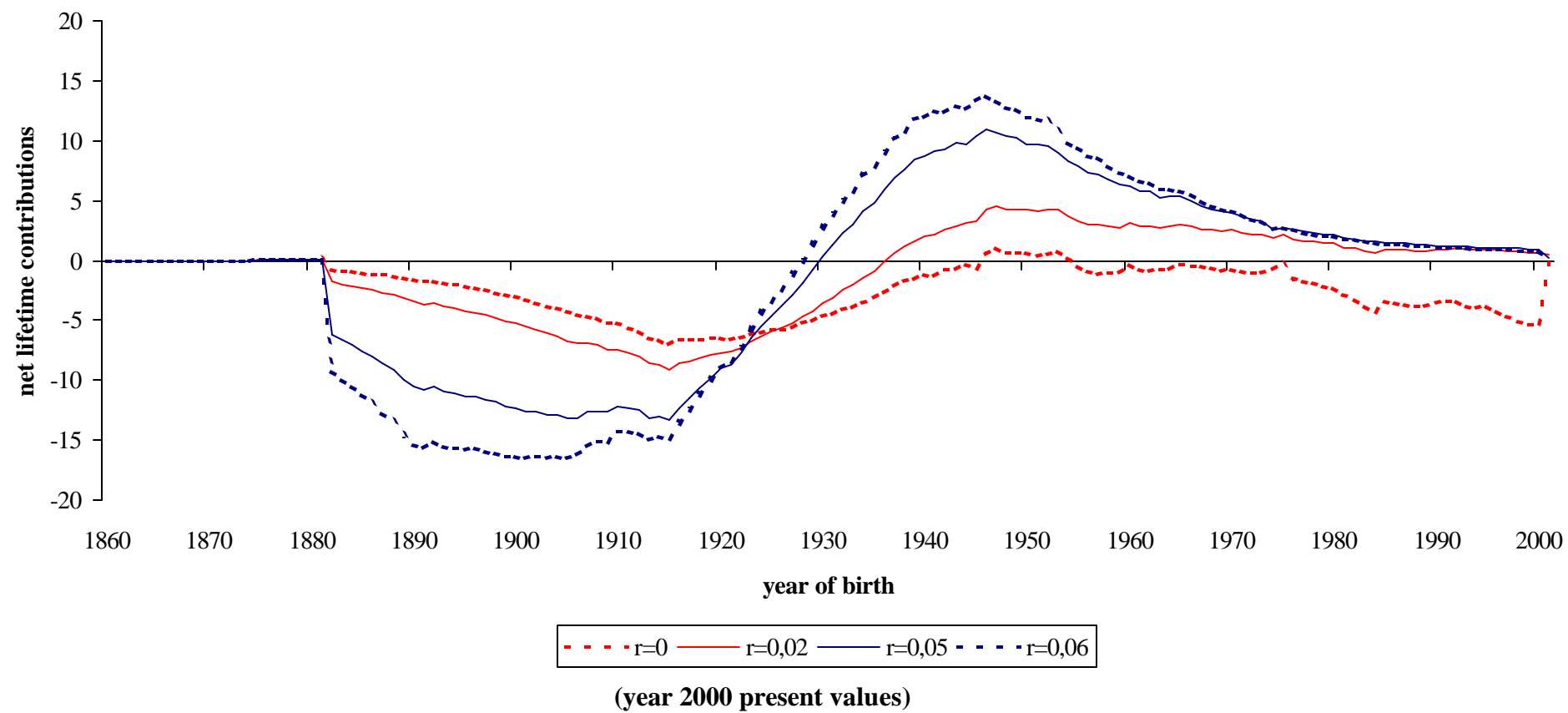
5 Past redistribution and future imbalances: robustness of the results

The net present value of lifetime-contributions depends to a substantial degree on how old a generation is during the year which serves as base for discounting and not just on how old they were when the system was established. Contribution and pension flows in the life of a generation are not parallel, first contributions have to be paid and then a pension can be claimed. As a result, for a number of cohorts this or that stage of life is closer to the base year of calculation, thus discounting has a different effect. Contributions by those who enter the system first are enlarged by discounting more than their pensions. The larger the discount rate, the larger the profits they realise seem. Exactly the opposite applies to those generations born more or less after 1980, whose active and retirement period will take place after the year 2000. Pensions are discounted more for them than contributions, that is why higher discount rates increase their losses. The lifetime net contribution for those year-groups born between them changes from year to year. Diagram 5 displays the lifetime net contributions with various discount rates.

The diagram shows that larger discount rates increase profits and losses both. In extreme cases, if we veer from discounting ($r = 0$), and calculate contributions and pensions in 2000 real value, then everybody is a winner, with the exception of those born between 1946 and 1954 and even their loss is low. This also coincides with the results from the American simulation.

Changes to the rate of growth for productivity does not significantly influence redistribution effects for those already born. We ran the model with the underlying 1.5 percent average annual productivity growth rate in addition to running it with 1 and 2

Diagram 5:
Net lifetime contributions in the Hungarian pension system by birth cohorts, with various discount rates



percent productivity growth rates. However, while discounting also influences the magnitude of lifetime net contributions retroactively, changes in productivity only has future effects. Thus, pressure on the active cohorts increases slightly if productivity grows faster than 1.5 percent per annum, and the balance for future generations improves. So, the assumption about the rate of productivity growth primarily effects the indicators on the sustainability of the pension system, that is, the generational account of people yet to be born, and the generational imbalance between the accounts of the 0 year olds and future generations.

The same applies to changes to the net contribution profile. As we showed in the beginning of this paper, pension revenues and expenses, and consequently the balance is far from being unambiguous. In addition to the above mentioned basic case we tried three alternatives as well. In an earlier study (Gál, Simonovits and Tarcali 2001) we used budget plans for the year 2000 since the actual figures had not been published yet. The revenue plan in question calculated with \$3,738.0 million, however the actual amount received transpired to be \$3,842.0 million, including that portion of contributions paid to mandatory private pension funds which is above the amount the central budget repaid to social security. The difference between plan and reality significantly influences both the generational imbalance and the system's long term balance. Similarly, if we revamp the year's contribution revenue with the interest on overdue payments and the reimbursed pensions mistakenly paid out, the starting balance and with it, the long term balance improves further. At the same time taking the two items mentioned into consideration, with the exception of future generations this will not cause any noticeable changes in the lifetime net contributions of any year-group at all. Pressure did not increase by more than 2 percent on any cohort. That is to say, measures of future imbalances are rather sensitive even to small changes in the starting up profile whereas redistribution results are robust. In the earlier study we ignored the interests on overdue payments and reimbursed pensions mistakenly paid out because, even though they are part of the contribution flow, they do not belong to the given year.

We also examined how lifetime net contributions would transform if we were not to take the entire sum for pensions and pension type services paid by social security into consideration as with other pension balance-sheets; not just the so called employment

policy pensions but temporary benefits and regular social benefits as well. The balance sheets improve according to expectations. This improvement reaches a 2 percent value of the accounts for those under 30 years of age then increasingly grows for those under 20 to 5 percent and to 7 percent for those under 10 and finally to 8 percent for new borns. However, the balance for future generations deteriorates significantly.

Tests of robustness allow for three conclusions. Firstly, definition and modelling conventions are necessary in order to reach the quality of results suitable for establishing political decision and for international comparisons. According to our second conclusion generational accounting, as a measurement technique for the long term sustainability of the budget system is much more sensitive to changes in the start up age profiles or in the model parameters, than as a measurement of redistribution effects. Our redistribution results, therefore, are quite robust. Finally, in concord with our earlier observations we experienced that at every real value for parameters significant intergenerational redistribution appears in the Hungarian pension system.

Methodological and empirical results of this research program are not the final word on the topic. Firstly, the current international standards followed in choosing a discount rate is arbitrary. In footnote 2 we raised the idea of a potential empirically based discount rates. This discount rate does not provide identical values for each year, say 2 to 5 percent, but rather it changes from year to year depending on the growth rate of total contributions cleaned of the effects of the expansion of the system. That is, this discount rate would be based on the yields on investments in increasing the next generation's ability to pay future contributions. The discount rate in question would have been well into the negative in the first half of the 1990s, just as the system matured, due to the employment shock and falling real wages in the Hungarian labour market.

Secondly, the intergenerational redistribution taking place in the pension system – though the extent is interesting in and of itself – does not necessarily show the same direction as redistribution in other sectors of the state organised intergenerational transfer chain, such as family support programs and education.

Thirdly, the intergenerational redistribution in the state organised intergenerational transfer chain is not a flawless indicator for complete redistribution between age groups of its own. This merely shows that an increasingly larger segment of intergenera-

tional transfer flows through various state agencies. Theoretically it is possible that the state merely squeezes the family out of the transfer chain without increasing the redistribution.

Fourthly, results of empirical research on redistribution provide only raw data for the social debate. We would not like to make redistribution itself appear faulty. The intergenerational transfer chain could serve as a type of intergenerational social security, which disperses the risks of external shock, stock market crisis, military defeat or invasion by a foreign power between those actually alive and later generations. This type of social security however, needs to function with such rules that make it clear as to under what conditions, how long, to what extent and which generations shall support which other generations. It would be wise to finance this type of support within a separate institutional system via special taxes set for such and to carry it out within the framework of special laws.

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